WHAT IS CLAIMED IS:

1. A method of forming a multiple-thickness oxide layer on a silicon substrate, the method comprising:

a) forming a sacrificial oxide layer on the silicon substrate;

b) patterning an implant mask layer on the silicon substrate to expose a selected first portion of the silicon substrate;

c) implanting oxygen into the selected first portion of the silicon substrate through the sacrificial oxide layer;

d) stripping the implant mask layer from the silicon substrate;

e) stripping the sacrificial oxide layer; and

f) growing an oxide layer on the silicon substrate, the oxide layer having an oxygen-implanted oxide region and a non-implanted oxide region.

2. The method of claim 1 wherein the non-implanted oxide region is less than about 30 Å thick.

3. The method of claim 1 wherein the oxygen is implanted in step (c) to a concentration of less than about $10^{17}/cm^2$.

4. The method of claim 1 wherein the oxygen is implanted in step (c) to a concentration of between about 5E15-1E16/cm^2.

5. A method of forming a multiple-thickness oxide layer on a silicon substrate, the method comprising:

a) growing a gate oxide layer on a silicon substrate;

b) forming a polysilicon layer on the gate oxide layer;

c) patterning an implant mask layer on the polysilicon layer;

d) implanting oxygen through the polysilicon layer;

e) stripping the implant mask layer from the substrate; and

f) annealing the substrate to form a thicker gate oxide region of the gate oxide layer, the thicker gate oxide region being oxygen-implanted oxide.

6. The method of claim 5 wherein the gate oxide layer is less than about 30 Å thick immediately after step (a).

7. A method of forming a multiple-thickness oxide layer on a silicon substrate, the method comprising:

a) forming a sacrificial oxide layer on the silicon substrate;

b) patterning an implant mask layer on the silicon substrate to expose a selected first portion of the silicon substrate;

c) implanting oxygen into the selected first portion of the silicon substrate through the sacrificial oxide layer;

d) stripping the implant mask layer from the silicon substrate;

e) stripping the sacrificial oxide layer; and

f) growing an oxide layer on the silicon substrate, the oxide layer being thicker in the oxygen-implanted oxide region in the selected first portion.

8. The method of claim 7 wherein the oxide thickness varies from about 30 Å to about 50 Å.

9. The method of claim 7 wherein step c) includes implanting oxygen into a second portion of the silicon substate under the implant mask layer, the oxygen concentration in the second portion being less than the oxygen concentration in the first portion, and the oxide layer over the first portion being thicker than the oxide layer over the second portion.

10. The method of claim 9 wherein the oxide thickness varies from about 30 Å to about 50 Å.

11. The method of claim 10 wherein the oxygen is implanted in the first portion to a concentration of about 1×10^{16} atoms cm^{-2} and the oxygen is implanted in the second portion to a concentration of about 5×10^{15} atoms cm^{-2}.

12. The method of claim 11 wherein the oxide thickness is about 50 Å over the first portion, about 40 Å over the second portion, and about 30 Å where oxygen is not implanted.

13. A method of forming a multiple-thickness oxide layer on a silicon substrate, the method comprising:

a) forming a high dielectric contrast dielectric layer on a silicon substrate;

b) forming a polysilicon layer on the dielectric layer;

c) patterning an implant mask layer on the polysilicon layer;

d) implanting oxygen through the polysilicon layer;

e) stripping the implant mask layer from the substrate; and

f) annealing the substrate to form an interfacial oxide layer under the dielectric layer.

14. The method of claim 13 wherein the dielectric layer is selected from the group consisting of silicon nitride, zirconium oxide, and hafnium silicate.

15. The method of claim 13 wherein the interfacial oxide layer is less than 2 nm in thickness.

16. A semiconductor device having a gate oxide of multiple thickness, the semiconductor device comprising:

a first gate oxide region having a first thickness, and

a second gate oxide region having a second thickness, the second gate oxide region being oxygen-implanted oxide, the second thickness being greater than the first thickness.

17. The semiconductor device of claim 16 wherein the first thickness is less than about 30 Å.

18. The semiconductor device of claim 16 wherein the first thickness is less than the second thickness by less than about 20 Å.

19. The semiconductor device of claim 16 wherein the first gate oxide region is non-implanted oxide.

20. The semiconductor device of claim 16, wherein the first gate oxide is oxygen implanted oxide, the implanted oxygen concentration being less than the implanted oxygen concentration of the second gate oxide region.